WE CLAIM AS OUR INVENTION:

1.   A method for marker-less navigation of a medical instrument comprising the steps of:

during a medical interventional procedure involving interaction of a medical instrument with a subject, intraoperatively acquiring a 3D image of the subject using a C-arm x-ray system;

bringing the medical instrument into registration with the 3D image, and thereby obtaining a first registration matrix;

bringing the 3D image into registration with respect to a pre-existing preoperative 3D image using an image-based registration, and thereby obtaining a second registration matrix; and

navigating said medical instrument in said preoperative 3D image.

2.   A method as claimed in claim 1 comprising obtaining said first registration matrix by marker-less registration.

3.   A method as claimed in claim 1 wherein said C-arm x-ray system has a C-arm subject to deformation, and comprising taking said deformation into account for determining said second registration matrix.

4.   A method as claimed in claim 1 comprising generating said preoperative 3D image dependent on a plan for said interventional procedure.

5.   An x-ray system comprising:

a C-arm on which an x-ray source and a radiation detector are mounted, said radiation detector generating electrical signals dependent on x-rays from said x-ray source incident thereon after attenuation by a subject adapted to be disposed between said x-ray source and said radiation detector; and

a control and processing unit for controlling operation of said x-ray source and for processing said electrical signals from said radiation detector, said control and processing unit, during a medical interventional procedure involving a medical instrument interacting with the subject, operating said x-ray source for acquiring an intraoperative 3D image of the subject, registering the medical instrument with respect to said intraoperative 3D image for obtaining a first registration matrix, registering the 3D image with respect a pre-existing preoperative 3D image stored in said control and processing unit, using an image-based registration, for obtaining a second registration matrix, and presenting a display of said preoperative 3D image allowing navigation of said medical instrument in said preoperative 3D image.